Answer on Question #76861 – Math – Statistics and Probability

Question

1. A discrete random variable can be described by the binomial distribution if it satisfies four conditions. State these FOUR (4) conditions.

Solution

The number of experiments n is fixed.
Each experiment is independent.
Each experiment represents one of two outcomes ("success" or "failure").
The probability of "success" p is the same for each outcome.

Question

2. The pass rate for a Statistics test in a class of MBA students is 65%. If five students are randomly selected from the class, determine the probability that at least two passed the test.

Solution

Using Binomial distribution:

$$n = 5, p = 0.65$$

$$P(x \geq 2) = 1 - P(x < 2) = 1 - P(x = 0) - P(x = 1)$$

$$P(x = 0) = \frac{5!}{0!\,5!} \cdot 0.65^0 \cdot 0.35^5 = 0.00525$$

$$P(x = 1) = \frac{5!}{1!\,4!} \cdot 0.65^1 \cdot 0.35^4 = 0.04877$$

Answer: $P(x \geq 2) = 1 - 0.00525 - 0.04877 = 0.946$

Question

3. Explain why the areas for only positive $z - values$ are given on a standard normal distribution table.

Solution

Since normal distribution curve is symmetrical, the areas under the curve:

$area\ from\ 0\ to\ z = area\ from - z\ to\ 0$

So, it is no need to use two tables, for positive and negative z-values.

Question

4. The weight of a packet of imported biscuits from a shipment is normally distributed with a mean of $500\ g$ and a standard deviation of $40\ g$. What percentage of packets of the shipment weighs between $540\ g$ and $560\ g$?

Solution

$$P(540 < x < 560) = P\left(\frac{540 - 500}{40} < z < \frac{560 - 500}{40}\right) = P(1 < z < 1.5) =$$

$$= P(z < 1.5) - P(z < 1) = 0.9332 - 0.8413 = 0.0919$$